

In the Claims

Please amend Claims 1, 9, 13, 15-17, and 19-21 as follows:

1. (Currently amended) A phase-locked loop, comprising:

a phase detector receiving an input signal and a first internal periodic signal and providing a phase signal indicative of a phase difference between said input signal and said first internal periodic signal;

a rotator receiving said phase signal and providing a first periodic signal and a second periodic signal each having a period being a function of said phase difference, said first and said second periodic signals being 90 degrees out of phase relative to each other, said rotator further comprising an enforcer which adjusts the amplitudes of the first periodic signal and the second periodic signal to within predetermined limits; and

an interpolator circuit linearly combining said first and second periodic signals with a third periodic signal and a fourth periodic signal to provide said first internal periodic signal.

2. (Original) A phase-locked loop as in claim 1, wherein said interpolator circuit further providing a second internal periodic signal, said second internal periodic signal being 90 degrees out of phase relative to said first internal periodic signal.

3. (Original) A phase-locked loop as in claim 1, further comprising a low-pass filter provided between said phase detector and said rotator.

4. (Original) A phase-locked loop as in claim 2 wherein said rotator comprises an integrator.

5. (Original) A phase-locked loop as in claim 1, wherein said first ( $Q$ ) and second ( $I$ ) periodic signals are given by the equations:

$$Q=A \cos(kf(p))$$

$$I=A \sin(kf(p))$$

where  $A$  is an amplitude of each of signals  $Q$  and  $I$ ,  $k$  is a gain of said rotator circuit, and  $f(p)$  represents a function of said phase difference.

6. (Original) A phase-locked loop as in claim 5, wherein said phase difference is represented in said phase signal as a voltage.

7. (Original) A phase-locked loop as in claim 5, wherein said function comprises integration.

8. (Original) A phase-locked loop as in claim 1, wherein said third and fourth periodic signals each have a frequency being substantially a frequency of said input signal.

9. (Currently amended) A phase-locked loop as in claim 5, wherein said ~~rotator~~ ~~further comprising an enforcer providing~~ provides an error signal indicating a deviation in said first and second periodic signals from said equations.

10. (Original) A phase-locked loop as in claim 9, wherein said error signal is a function of the value  $\Delta = r^2 - I^2 - Q^2$ , where  $r$  is an amplitude of each of signals  $I$  and  $Q$ .

11. (Original) A phase-locked loop as in claim 5 wherein said third ( $x$ ) and fourth ( $y$ ) periodic signals are given by the equations:

$$x = \sin \omega t,$$

$$y = \cos \omega t,$$

where  $\omega$  represents a frequency of said third and fourth periodic signals.

12. (Original) A phase-locked loop as in claim 11, wherein said first internal periodic signal  $S(t)$  is given by:

$$S(t) = \sin(\omega t - \varphi),$$

where  $\varphi$  is indicative of said phase difference.

13. (Currently amended) A method for providing a phase-locked loop, comprising:

receiving an input signal and a first internal periodic signal and providing a phase signal indicative of a phase difference between said input signal and said first internal periodic signal;

receiving said phase signal and providing a first periodic signal and a second periodic signal each having a period being a function of said phase difference, said first and said second periodic signals being 90 degrees out of phase relative to each other;

adjusting the amplitudes of the first periodic signal and the second periodic signal to within predetermined limits; and

linearly combining said first and second periodic signals with a third periodic signal and a fourth periodic signal to provide said first internal periodic signal.

14. (Original) A method for providing a phase-locked loop as in claim 13, further providing a second internal periodic signal, said second internal periodic signal being 90 degrees out of phase relative to said first internal periodic signal.

15. (Currently amended) A method for providing a phase-locked loop as in claim 13, further comprising providing a low-pass filter between said phase detector and said rotator.

16. (Currently amended) A method for providing a phase-locked loop as in claim [2] 14 wherein said rotator comprises an integrator.

17. (Currently amended) A method for providing a phase-locked loop as in claim 13, wherein said first ( $Q$ ) and second ( $I$ ) periodic signals are given by the equations:

$$Q = A \cos(kf(p))$$

$$I = A \sin(kf(p))$$

where  $A$  is an amplitude of each of signals  $Q$  and  $I$ ,  $k$  is a gain of said rotator circuit, and  $f(p)$  represents a function of said phase difference.

18. (Original) A method for providing a phase-locked loop as in claim 17, wherein said phase difference is represented in said phase signal as a voltage.

19. (Currently amended) A method for providing a phase-locked loop as in claim [5] 17, wherein said function comprises integration.

20. (Currently amended) A method for providing a phase-locked loop as in claim [12] 13, wherein said third and fourth periodic signals each have a frequency being substantially a frequency of said input signal.

21. (Currently amended) A method for providing a phase-locked loop as in claim 17, ~~further comprising wherein said adjusting comprises~~ providing an error signal indicating a deviation in said first and second periodic signals from said equations.

22. (Original) A method for providing a phase-locked loop as in claim 17, wherein said error signal is a function of the value  $\Delta = r^2 - I^2 - Q^2$ , where  $r$  is an amplitude of each of signals  $I$  and  $Q$ .

23. (Original) A method for providing a phase-locked loop as in claim 17 wherein said third ( $x$ ) and fourth ( $y$ ) periodic signals are given by the equations:

$$x = \sin \omega t,$$

$$y = \cos \omega t,$$

where  $\omega$  represents a frequency of said third and fourth periodic signals.

24. (Original) A method for providing a phase-locked loop as in claim 23, wherein said first internal periodic signal  $S(t)$  is given by:

$$S(t) = \sin(\omega t - \phi),$$

where  $\phi$  is indicative of said phase difference.